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Digital health & low-value care

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ABSTRACT

Digital health advances offer a multitude of possibilities to improve public health and individual wellbeing. Little attention has been paid, however, to digital health's potential to create low-value care - the reduction of which is increasingly appreciated as a policy priority. This commentary provides a framework to illustrate the potential for consumer-facing digital health to generate three distinct categories of low-value care; 1) ineffective care because it is underdeveloped, 2) inefficient care because it supplements rather than substitutes, or 3) unwanted care because it is not aligned with clinician and patient preferences. We offer specific policy recommendations to reduce each type of low-value care.

1. Introduction

Digital health is growing at a fast pace, rapidly transforming the way health care is delivered and how patients and clinicians interact. The recent steady growth of telehealth visits,[1] was markedly accelerated by the COVID-19 pandemic leading to multifold increases in video visits in the span of just a few weeks.[2] The rapid development of digital health products offers timely opportunities to improve health and health care, but also may create low-value care. This commentary, developed by members of an AcademyHealth thematic working group, offers a conceptual framework to consider the potential for digital health to generate low-value care and to offer policy solutions. We assert that digital health may potentiate three types of low-value care; 1) ineffective care because it is underdeveloped, 2) inefficient care because it adds unnecessary care rather than replaces it, or 3) unwanted care because it does not align with patient and clinician preferences. With all the excitement around digital health advances and the hope it garners in reducing the spread of COVID-19,[3–5] thoughtful consideration about the potential for harms to exceed benefits – the traditional definition of a low value service - has never been more urgently needed.[6]

2. The promise of digital health: substituting, augmenting, and creating new health care

The term "digital health" covers a wide array of hardware and software technologies including, but not limited to, mobile health (mHealth), wearable biosensors and garments, telemedicine, artificial intelligence, web-based analysis, virtual reality, robots, and emerging technologies intended to improve health care services, public health and patient well being, reduce inefficiencies, and personalize health care.

Our conceptual framework is presented in Table 1. The first three rows categorize digital health by their intention to improve health or health care delivery by 1) offering a more efficient, and equally effective substitute for in-person care; 2) augmenting the care process, encouraging better self-management of disease, or allowing for greater personalization of care to enhance the patient's experience of care, or 3) enabling new care, such as expanding access to rural areas, or reaching otherwise underserved populations by providing more timely or convenient interactions.

Illustrating digital health's potential to substitute for care, internet-delivered cognitive behavioral therapy can be as effective as in-person

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Table 1
Typology of low-value care generated by consumer facing digital health technology with proposed policy solutions.

Intended Effect of Digital Health Technology	Type of Low-Value Care: **Ineffective** *potentiates harm*	**Inefficient** *adds care*	**Unwanted** *misaligned with patient preference*
Substitutes for existing care	***Underdevelopment.*** Many untested technologies create patient harm due to lack of regulation. Minimal evidence for effectiveness of mobile apps to manage mental health disorders[45] and for some users, the apps are no more effective than placebo.[46]	***Increased Utilization.*** Intended substitutes actually add care. Tele-mental health visits are intended to substitute for in-person care, but actually add to the number of visits.[26]	***Burden of choice.*** Burden on the consumer to choose apps, but less than 1% of mental health apps are evidence-based despite more than 50% making claims about evidence.[19] Weeding through multitudes of untested apps is labor intensive & time consuming.[47,48]
Augments existing care	***Lack of Evidence.*** Apps are numerous, but very few are evidence-based. Of 280 diabetes mobile applications, five are associated with clinical improvement and none were of high methodological quality.[18] Smartphone vital sign monitors are not consistently accurate and may contribute to patient harm.[22] Measurements from a popular instant blood pressure app were highly inaccurate. 77.5% of individuals with high blood pressure were falsely reassured that their blood pressure was normal.[21]	***Unnecessary Utilization.*** The benefits of wearables can be offset by over-diagnosis, overtreatment and result in unnecessary utilization. Impact of remote patient monitors on clinical outcomes is not statistically significant.[49] Apple watches with EKGs are meant to detect undiagnosed arrhythmias, but have not been adequately tested yet. False positives will cause needless follow up expense and emotional distress.[50,51]	***Data Overload.*** The experience of digital self-monitoring can be too distressing and exhausting for people living with acute and chronic illnesses.[30]
Creates new care	***Potential Loss of Quality.*** Virtual care affects clinical decision-making. Telemedicine clinicians are less likely to order appropriate testing for strep[52] and more likely to result in inappropriate antibiotic prescribing in children than clinicians in offices.[25]	***Moral Hazard of Convenient Care.*** Telehealth platforms enhance convenience and increase access, which potentiates unnecessary utilization. The vast majority (90%) of telehealth visits may represent new utilization and are not substitutes for in-person care.[53]	***Changing Nature of Patient-Clinician Relationships.*** The loss of face time with patients is cited as a major cause of clinician burnout.[32]
	Policy Solutions		
	Limit. Increased federal regulation & outcomes research on unregulated digital health.[40]	***Lean.*** Telehealth triage protocols[38] and required efficacy and risk labels for mHealth apps.[40]	***Listen.*** Patient-centered shared decision-making, with institutional support.[54]

care[7] and offers a nonpharmacologic alternative for chronic pain management.[8–10] Much of digital health augments rather than replaces existing care, as it is integrated into the pre-existing model of care. For example, supplemental text messaging improves treatment adherence and symptom surveillance for mental health disorders and other chronic conditions.[11,12] Digital health also has the potential to create new care opportunities for underserved populations, such as providing front-line care delivery in schools,[13] or access to specialists in rural and underserved areas.[14,15]

3. Illustration of digital Health's potential to exacerbate low value care

The columns of the framework use Verkerk's typology[16] to organize digital health by the potential to generate low-value care because it is either ineffective, inefficient, or unwanted.

Digital health risks produce ineffective low-value care when the technology is undertested and potentiates harm. The vast majority of mHealth applications do not meet the Federal Drug Administration's (FDA) definition of a medical device and are available to consumers without validation.[17] However, only 1% of mental health apps and 2% of diabetes apps have evidence that they are effective.[18,19] Mobile apps designed to measure vital signs can be inaccurate, falsely reassuring patients and heightening the risk of poor clinical outcomes.[20–23] Furthermore, the virtual care setting may change clinical decision-making, negatively impacting quality of care. For example, studies show clinicians are more likely to overprescribe antibiotics and less likely to test for streptococcal pharyngitis during tele-heath visits, as compared to traditional care.[24,25]

Digital health may also create inefficient low-value care by generating additional, unnecessary health care. For example, despite the intent to replace traditional visits with telemedicine encounters, some studies show that telehealth visits potentially add to visits rather than replace them, bringing only marginal clinical value.[26] In another example, wearable sensors that monitor vital signs have a range of accuracy[20] and therefore may result in overdiagnosis, overtreatment, and unnecessary utilization. Even for those technologies with higher diagnostic accuracy, such as the AppleWatch with EKG,[27] there is no consensus on the benefits of population-level screening for conditions such as atrial fibrillation,[28] especially for relatively younger and lower risk AppleWatch users. As the AppleWatch using population grows, the number of false positives will swell–spurring increases in follow up EKGs, stress tests, unnecessary costs, as well as unneeded patient risk and clinician burden.[29]

Digital health generates unwanted low-value care if it causes undue burdens or undesirable effects for patients, caregivers, or clinicians. These can include the challenge of choosing from a potentially overwhelming number of digital health products on the market, or the stress, time expense/trade-offs, and distraction associated with digital self-monitoring.[30] In many instances, digital health alters the way that care is delivered as patients and clinicians spend more time interacting through screens rather than through face–to-face encounters. Virtual care may render the patient-clinician relationship more shallow and transactional than traditional care, as it is more likely to be focused on managing patient requests rather than engendering trust.[31] Clinician well-being is also affected as they cite loss of face time with patients as a major source of burnout.[32]

4. Policy solutions to mitigate low-value care generated by digital health

While the elimination of low-value care has become a recent policy priority,[33] little attention has been paid to the prevention and reduction of low-value care generated by digital health. Verkerk's framework[16] offers guidance about which strategies may be most effective for managing low-value care potentiated by digital health. The bottom row of our framework illustrates Verkerk's three policy mechanisms adapted specifically for digital health with the goals to limit ineffective care, lean out inefficient care and listen to patient and clinician perspectives on unwanted care. Reimbursement policy is a powerful tool to limit the use of undertested, ineffective, or potentially harmful digital health products. Given that the FDA only requires precertification review28 for telehealth technologies that function as medical devices (a small proportion of telehealth), many digital health technologies remain available to consumers without rigorous evaluation.[34] Further research is needed to study the downstream effects of low-value care created by unregulated digital health, such as the impact on patient outcomes, health care costs and utilization as well as racial, ethnic and economic health disparities. In response to the COVID-19 pandemic, payers relaxed many telehealth-related reimbursement and statutory regulations reducing prior barriers. This environment spawned a series of funding initiatives[35–37] to support research on the benefits and harms of expanded use. Such valuable research should continue. The potential to generate low-value care is an important consideration in all stages of evaluation and is critical to protecting the public from the consequences of ineffective digital health products and unnecessary utilization.

As most of the digital health technologies discussed here are consumer-facing, clinicians, health systems, and other organizations have an important role in leaning out the potential inefficiencies created by digital health such as the costly cascades of tests and appointments following inaccurate mHealth vital sign measurements. Health care systems could support consumers and clinicians alike by identifying the small subset of effective and rigorously evaluated apps to improve disease self-management. Some health systems are establishing triage protocols to guide patients and clinicians on the appropriate use of telehealth visits.[38] Transparency could be further facilitated by a private sector entity, like Consumer Best Buy Drugs,[39] to develop efficacy and risk data for digital health technology. As suggested by others,[40] app developers could be required to display this efficacy and risk data on health app labels, similar to FDA nutrition labels.

And finally, it will be important to listen to better understand unwanted care related to digital health. Readily accessible consumer information could increase awareness and empower patients to recognize and articulate their preferences related to the use of digital health, thus promoting shared decision-making between patient and clinician. Genuine shared decision-making is patient-centered and does not place a clinician's affinity for digital health above a patient's preference to avoid it, or vice versa. Institutional protocols could guide clinicians in these dialogues with patients, especially addressing issues of eHealth literacy, privacy, and trust. Strategies about when and how to incorporate digital health into care models needs to be tailored to the individual patient.

We agree that digital health holds tremendous promise in reducing disease burden and health care costs. However, digital health may potentiate care that is ineffective because it is underdeveloped, inefficient because it adds unnecessary care rather than replaces it, or unwanted because it is burdensome and changes the way patients and clinicians interact. We echo the call to foster a market of evidenced-based digital health products.[41–44] We add to this charge, the importance of careful consideration of low-value care as a potential byproduct of rapidly adopted digital health, now even more salient given the COVID-19 pandemic.

Disclosures

The views presented in this article are solely the responsibility of the authors and do not necessarily represent the views of the Patient-Centered Outcomes Research Institute (PCORI), its Board of Governors, or its Methodology Committee.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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